



BASIN HIGHLIGHTS REPORT of the Red River Basin



April 2000

Drought, a word that reverberates fear in mankind, is a fact of life in much of Texas, and is just another obstacle that the people of the Red River Basin must surmount. In the past nine years the Clean Rivers Program has successfully embedded the goals of the Clean Rivers Act, as envisioned by the 71st Legislature, into the environmental community. As the state weathers yet another drought, Red River Authority of Texas and the people of the Red River Basin will triumph over this adversity and persevere with the goals of the Clean Rivers Program.

About the Basin

The Red River Basin encompasses 43 counties in North Texas. Originating in eastern New Mexico, the river flows across the Panhandle where it becomes the Texas-Oklahoma boundary, then continues its course across Texas into southwest Arkansas to Louisiana and the Mississippi River, covering a drainage area of 94,450 square miles and 1,616 stream miles. Six major ecoregions and contrasting elevations from 4,835 feet to 495 feet with rainfall amounts of 15 to 55 inches aid in the creation of this diverse area. The basin contains 32 major reservoirs in Texas which provide water to more than a million people who live and work in the Red River Basin of Texas.

Clean Rivers Program Goals

In an effort to facilitate improved planning, monitoring, geographical analysis and dissemination of information, the Red River Basin was divided into five sub-basins or reaches,

then further divided into subwatersheds. The following goals are targeted to comprehensively assess the basin and implement positive procedures to conserve, reclaim and protect the water resources of the Red River Basin:

#1 - Identify Water Quality Conditions

Selectd water quality monitoring sites have been designated for collection of chemical, physical and biological data. Collected samples are analyzed in the field, at the Authority's Environmental Laboratory or at a contract lab. Within days of collection, the results of the analyses are entered into the data repository, which currently contains more than five years of quality-assured water resource information of the basin. The data, obtained from 44 monitoring stations, are then screened utilizing methodologies and criteria approved by the Texas Natural Resource Conservation Commission (TNRCC). Data entered into the database are immediately available for use by the public via the Authority's website - www.rra.dst.tx.us/CRP, and assists local communities who are facing stricter permitting requirements to make informed decisions about their water resource management practices, based on good science.

The overall condition of the water resources within the basin is classified as good with respect to stream standards, and supports aquatic life and uses. However, only 12 of the 29 classified stream segments have been designated for public water supply use, because of naturally high concentrations of salt. Chlorides and sulfates are the main constituents contributing to the high levels of dissolved solids found in the waters of the Pease River, Prairie Dog Town Fork of the Red River and the Wichita River. These rivers are highly saline and contribute more than 65% of the dissolved solids load into the main stem of the Red River. Salinity in these streams during low-flow periods matches or exceeds the salinity of sea water. For more details on the monitoring results, access our website at www.rra.dst.tx.us/CRP

#2 - Find Feasible Solutions to Control Pollution

Feasible solutions will only be identified through continual strategic water quality monitoring and analysis. Water quality data collected in the Red Basin utilize quality assured protocols to provide vital information necessary for development of appropriate water quality standards, preparation of an inventory of water quality, development of a list of impaired waterbodies and development of appropriate wastewater discharge permits.



In 1999 the Authority initiated annual coordinated monitoring meetings with all monitoring entities within the basin. These coordinated meetings ensure coverage of the entire basin, avoid duplication of effort and allow the monitoring partners to share information. The coordinated collection, analysis and management of water quality data provide vital scientific solutions for maintaining the availability and quality of natural resources for all intended uses. Red River Authority of Texas, the U.S. Geological Survey and the TNRCC Regional Offices unitedly conduct water quality monitoring at key stations under the TNRCC approved Quality Assurance Project Plan (QAPP).

Since the Red River Basin is a part of Group A in the five-year planning cycle, the focus for FY 2000 is strategy development. Strategy development and/or a *watershed action plan* outlines the steps necessary to reduce pollutant loads in a certain body of water to restore and maintain human uses or aquatic life support. The development of TMDLs (Total Maximum Daily Loads) and watershed action plans is considered to be the best method to improve water quality. A TMDL is the maximum amount of a pollutant that a lake, river or stream can receive without seriously harming its beneficial uses.

TMDLs are designed for impaired waterbodies contained in the Clean Water Act's draft §303(d) list for 2000. The ten waterbodies in the Red River Basin currently included on the §303(d) list are Pine Creek, Big Mineral Creek, Red River above Lake Texoma, Red River below Pease River, Buck Creek, Little Wichita River, Beaver Creek, Middle Fork of Pease River, Mackenzie Reservoir and Upper Prairie Dog Town Fork of the Red River. Although all of these listings indicate a *low priority*, except the Red River above Lake Texoma, which is a *medium priority*, strategies necessary to improve their rating are significant components of the coordinated monitoring plan. TMDL development of waterbodies on the §303(d) list for this basin are scheduled for FY 2002.

The Red River Chloride Control Project continues as one of the major pollution control programs in the basin. The U.S. Army Corps of Engineers is in the process of preparing the *Wichita River Basin Project Reevaluation*, which is due in November 2000. Its goal is to evaluate the overall effectiveness of the implemented control features and the environmental impact of reducing chloride levels in the watershed.

#3 - Public Education and Involvement

A primary reason for the success of the Clean Rivers Program is its emphasis on *public participation and education*. Through this forum, the people of the Red River Basin have been able to broaden their awareness of water quality conditions, utilize the knowledge and expertise of many, and work together to rectify identified problems. It has provided an opportunity for the regulating agencies to display a more favorable image. It has allowed the Authority, cities, counties, industries, agriculture, and the general public to meet on common ground and collectively resolve issues to secure a higher quality of life without the apprehension of earlier periods. It has given the people of the basin an opportunity to provide their experience and understanding of this area of the state to the people who *set the standards*.

This process gives the public an opportunity to qualify the need for any changes.

Public participation provides for effective watershed planning and management by ensuring that local concerns are accurately addressed and that the people are well represented. The Authority relies upon the guidance and counsel of the Steering Committee to maintain focus on the programs that are consistent with the priorities and issues facing the local communities.

Steering Committee Meetings open to the public were held in Amarillo and Wichita Falls, thus allowing the people to voice their concerns and to learn more about the water quality and other natural resource issues with their basin. The consensus of these meetings indicated the programs initiated and the expenditure of resources to achieve compliance with the directives of the CRP are prudent. They agreed that additional data are needed to further evaluate the basin water quality trends and to develop effective action plans for the protection of water resources. Consequently, resources were directed toward maintaining key fixed stations for the collection of baseline data.

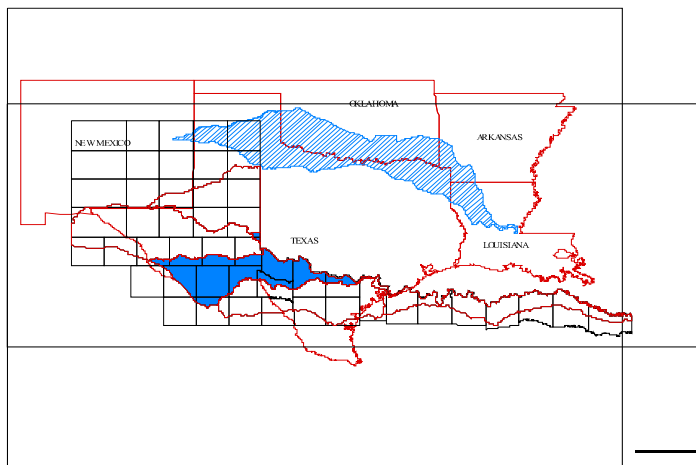
The Authority's website contains a myriad of information easily accessible by anyone at www.ra.dst.tx.us/CRP. Educational programs for public and private schools are available from kindergarten to the high school level. Opportunities for internships with other resource agencies are available for students entering college. Additionally, presentations on several water resource subjects are available for interested entities and civic groups, all of which are sponsored by the CRP.

#4 - Provide Administrative and Technical Assistance to Local Entities

During its 40 year history, the Authority's mission has been one of beneficial service to the public concerning water conservation, reclamation, protection and development of water resources. The Clean Rivers Program mirrors this goal and has allowed the Authority and TNRCC to use their expertise concurrently to assist the public. Through continuous critique by stakeholders and the steering committees, the assistance that the CRP provides parallels the basin's needs. Coordination of permitting and provisions for quality assured data enable the regulator and the regulated community to work together to find reasonable solutions, moving toward improved management practices for protecting the water resources.

The development of a common QAPP is an example of local entities working together toward a common goal - quality assured data. The central clearinghouse for current inventories of water quality, water resource and socio-economic data related geographically is rapidly becoming a dependable resource for everyone.

The Authority is committed to the people of the basin, as well as the goals of the Clean Rivers Program. Together we can achieve our ultimate goals, from the smallest community to the largest city.

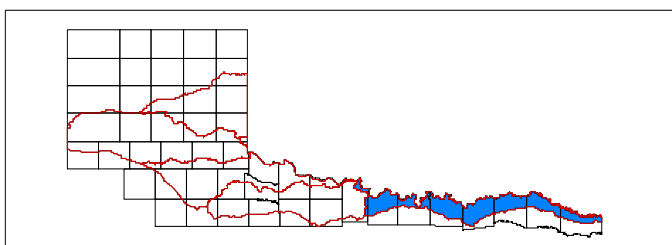


FIVE REACHES OF THE RED RIVER BASIN

For the assessment to be comprehensive in nature and useful as a resource management tool, an analytical watershed approach was followed for proper identification and isolation of individual factors or elements having an influence on the quality of the water resources obtained from large geographical areas. Each primary area of study was hydrologically divided into five basin reaches containing approximately 7,000 square miles each.

Reach I - The Red River main stem watershed from the Texas-Arkansas state-line upstream to the confluence of Cache Creek and Red River. (Bowie County to Montague County)

There are five subwatersheds in this reach totaling 7,698 square miles of contributing drainage area in Texas, Arkansas and Oklahoma, 3,600

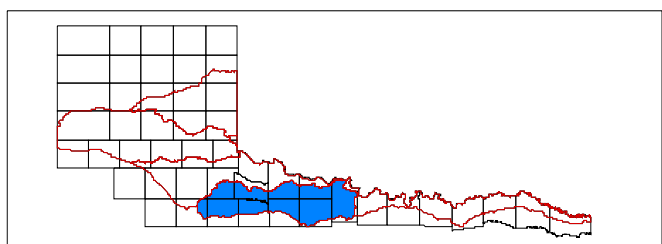


square miles in Texas, and three classified stream segments. There are 45 municipal and industrial permits with a total discharge of 42.9 MGD, 15 permitted solid waste disposal sites and 123 water rights permits issued in this reach. Ten water quality monitoring stations had sufficient data for screening in this reach. The Authority conducted 40 monitoring events during this period and 926 parameters were screened and analyzed. Of the constituents screened, dissolved oxygen, pH, chromium, nickel and manganese were identified as parameters which exceeded the screening criteria. Two low concentrations of DO were measured in Mud Creek, Segment 201, during the summer of 1997. A lack

of freshwater inflow, sluggish stream velocity and heavy surface shading are believed to be the cause of the low DO readings in this segment. pH also exceeded the screening criteria in Mud Creek, Segment 201. However, the low measurements of pH do not represent exceedences of the water quality standards. Elevated concentrations of chromium, nickel and manganese have been found in the sediments of Lake Texoma. Because there are no standards or criteria for determining whether these concentrations are high enough to adversely affect water uses, a study of the occurrence and significance of metals in sediment has been recommended.

Reach II - Wichita River and Little Wichita River watersheds, from the confluence with the Red River to their headwaters. (Clay County to Cottle/King/Dickens Counties)

Reach II contains five subwatersheds, ten stream segments and 4,951 square miles of contributing drainage in Texas. There are 23 municipal and



industrial permits with a total discharge of 24.5MGD, 25 permitted solid waste disposal sites and 53 water rights permits issued in this reach. Nineteen water quality monitoring stations had sufficient data for screening. The Authority conducted 49 monitoring events during this period and 1,514 parameters were screened and analyzed. Of the constituents screened, chlorophyll-*a*, dissolved oxygen, chloride, barium, nickel and manganese were identified as parameters warranting further study. In Segment 211, low DO and high chlorophyll-*a* concentrations were found. Low DO has been consistently noted in previous assessments in this segment. Low DO and high chlorophyll-*a* concentrations

typically occurred during warmer weather. However, Segment 211 has been included on the CWA 303(d) list for DO as a low priority. Further study indicates that the low DO swings may be attributed to the minimal or no flow conditions during the prevailing drought and algal activity. There was not a good correlation between the high chlorophyll-*a* and low DO measurements. Chlorides in the Wichita Basin are a continuing concern due to their limiting use of the water resources, showing an increase in concentrations as flow conditions decrease. Barium, nickel and manganese concentrations were found in sediments in Segment 214. There are no current criteria for determining whether these concentrations are high enough to adversely affect water uses and will be examined further for trends as monitoring progresses.

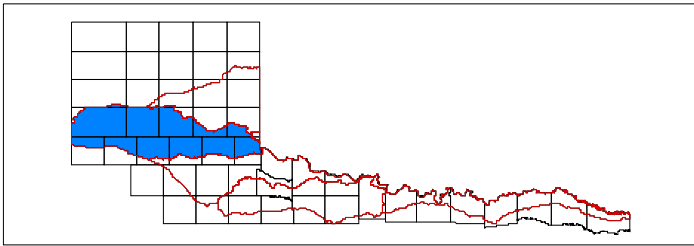
Reach III - Pease River watershed from the confluence with the Red River to its headwaters, including the Red River main stem from the confluence of Cache Creek upstream to the confluence of Buck Creek and Red River. (Wichita County to Swisher/Briscoe/Floyd Counties)

The five subwatersheds contained in Reach III have 5,734 square miles of contributing drainage in Texas and Oklahoma with 4,845 square miles and five classified stream segments in Texas. There are 19 municipal and industrial permits with a total discharge of 142.3 MGD, 14 permitted

solid waste disposal sites and 28 water rights permit issued in this reach. Five water quality monitoring stations had sufficient data for screening. The Authority conducted 64 monitoring events during this period and 2,254 parameters were screened and analyzed. Of the constituents screened, temperature, chloride, sulfate, total dissolved solids, fecal coliform and cadmium were identified as parameters which warrant further study. Fecal coliform in Segment 205 exceeded screening criteria during the warmer months and appears to be a result of naturally occurring conditions and extremely low flows. This is also true in the case of chloride, sulfate, TDS and temperature in Segment 221, which exceeded the screening criteria during warmer months. These two segments have been included on the list of impaired waters, better known as the CWA 303(d) list. These constituents will be monitored more closely to determine the significance of exceeding the criteria and possible removal from the 303(d) list based on their natural occurrences. Although cadmium was identified as a concern, there was insufficient data to screen for exceedence criteria during this period.

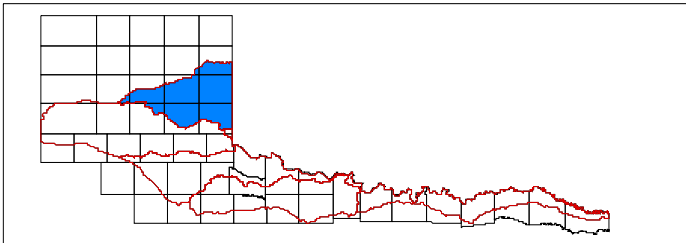
Reach IV - Prairie Dog Town Fork Red River from the confluence of Buck Creek and Red River upstream to the Texas-New Mexico state-line. (Childress/Collingsworth Counties to Deaf Smith/Parmer Counties)

Reach IV contains five subwatersheds with 7,626 square miles of contributing drainage in Texas and Oklahoma, with 7,084 square miles in Texas and three classified stream segments. There are 20 municipal and industrial permits with a total discharge of 21.7 MGD, 17 permitted solid waste disposal sites and 55 water rights permits issued in this reach. Six water quality monitoring stations had sufficient data for screening. The Authority conducted 48 monitoring events during this period and 1,832 parameters were screened and analyzed. Of the constituents screened, chloride, sulfate, total dissolved solids, fecal coliform and barium were identified as parameters of concern which warrant further study. All three segments in this reach are on the list of impaired waters pursuant to the CWA 303(d) list. Segment 207, the Lower Prairie Dog Town Fork of the Red River, exhibited infrequent exceedences for fecal coliform. Naturally occurring factors, as well as anthropogenic causes, can contribute to the occasional exceedences of fecal coliform. Further monitoring has been implemented to determine the actual causes. Segment 228, Mackenzie Reservoir, exhibited elevated concentrations of dissolved solids, which is likely due to low inflows from Tule Creek and considered naturally occurring conditions. Segment 229 found concentrations of chloride, sulfate and TDS. The high dissolved solids contaminations are believed to be a result of naturally occurring conditions coupled with abnormally low flows. Barium was also found in sediments of Segment 229. Because there are no criteria for determining whether these concentrations are high enough to adversely affect water uses, further study is needed to determine the potential significance of barium in sediments and will be included in future monitoring activities.



Reach V - North Fork Red River from the Texas-Oklahoma state-line upstream to the headwaters of McClellan Creek, including the headwaters of the Salt Fork Red, Red River, Elm Fork of Red River and the Washita River. (Collingsworth/Wheeler/Hemphill Counties to Potter County)

Reach V includes six subwatersheds with 7,580 square miles of contributing drainage in Texas and Oklahoma, with 4,124 square miles and three classified stream segments in Texas. There are 14 municipal and industrial permits with a total discharge of 5.9 MGD, 15 permitted solid waste disposal sites and 39 water rights permits issued in this reach. Four water quality monitoring stations had sufficient data for screening. The Authority conducted 13 monitoring events and 440 parameters were screened and analyzed. Of the constituents screened, temperature, sulfate, barium and manganese were identified as parameters that occasionally exceeded the screening criteria. With the exception of barium and manganese in sediment found in Greenbelt Reservoir, the constituents of temperature and sulfate were attributed to naturally occurring conditions and should not be considered a water quality concern. The metals found in sediment exhibit only a potential concern because of their existence. Since there are no criteria for these metals concentrations in sediments, relationships between sediment concentrations and concentrations in an overlying waterbody have not been determined. Additional studies are proposed for further monitoring activities to determine the potential significance of metals in sediments.



Additional information and details of the screening analysis results are available on the Authority's website at www.rra.dst.tx.us/Publications/CRP or a copy of the Basin Summary Report can be obtained by contacting the office at (940) 723-0855.

All parameters screened utilized the State's Surface Water Quality Monitoring Standards, and, as such, do not reflect drinking water standards.